

SOURCE INVENTORY

CATEGORIES # 326 – 327, 1292

HEAVY DUTY NON-FARM EQUIPMENT (GASOLINE & DIESEL POWERED)

1999 EMISSIONS

Introduction

These categories account for exhaust emissions from heavy duty non-farm gasoline and diesel equipment used in construction, mining and logging operations.

Methodologies

Prior to the 1999 Base Year emissions, the methodology for heavy duty non-farm equipment categories was based on Booze, Allen, and Hamilton's (BAH) "Report on Utility Equipment Emissions in the State of California". The report listed each type of equipment such as pavers, compactors, cranes and excavators, state-wide annual sales records by engine type (gasoline and diesel) and power rating (up to 500 hp). These were used, together with scrappage rates established by Power Systems Research (PSR), to establish equipment population. PSR also developed average hourly use and load factors for each type of equipment. The statewide activity (in brake horse-power-hour) by equipment type was thus estimated. Emission factors were obtained from the Engine Manufacturers Association and a 1988 study by the Energy and Environmental Analysis.

In 1998, the California Air Research Board (CARB) developed an off-road vehicle emission inventory (OFFROAD) model to estimate emissions from off-road motor vehicles for all counties and air basins in California. The OFFROAD model contained a more comprehensive list of equipment from a wider range of categories compared to BAH. The OFFROAD model added an inventory estimate for engines powered by diesel fuel, compressed natural gas (CNG) and liquid petroleum gas (LPG) which were not previously accounted for in the BAH report.

Base Year 1999 emissions for heavy duty non-farm equipment categories in the Bay Area were obtained from the CARB's OFFROAD model.

Monthly Variation

Monthly variation of emissions was assumed to be 60% for the months of April to September and 40% for the other remaining months. Weekly activity takes place during weekdays only. Most of the daily activity occurs during daylight hours.

County Distribution

County emissions were provided by the CARB's OFFROAD model.

TRENDS

Growth

Projected emissions for heavy duty non-farm equipment categories were estimated based on ARB's Off-road vehicle emission inventory model. The growth factors utilized in the OFFROAD model are based on a report for the Air Resources Board entitled "A Study to Develop Projected Activity for "Non-Road Mobile" Categories in California, 1970-2020". In this report, certain economic indicators are used to project the growth in population and usage of small off-road engines in various applications.

Control

In December of 1990, the CARB adopted two levels of emission standards for small off-road engines. The first phase of standards (Tier 1) was implemented in 1995 and Tier 2 standards were implemented in 1999. The deterioration rates for 4 stroke Tier 1 engines were derived from data supplied by engine manufacturers. Since engines meeting Tier 2 standards are not yet available, engineering judgment was used to estimate the effect of the more stringent standards.

Projected emissions include expected benefits from ARB's Clean Diesel Regulations in 1993, Re-Formulated Gasoline Phase II and EPA's diesel engine standards beginning 1999. These benefits were estimated using control factors developed by ARB.